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Prevention, Detection, and Control of Nursery Tree Diseases

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ABSTRACT.—Describes integrated control measures involving chemical, cultural, genetic, biological, and legal control methods that can be used to reduce the impact of tree diseases in nurseries.

KEY WORDS: Disease control, nursery management, pest guidelines.

Nursery tree diseases and other pests can cause heavy economic losses in the nursery by deforming or killing trees, slowing their growth, discoloring foliage, increasing susceptibility to other organisms or environmental stresses, and delaying rotations. To prevent or reduce such losses, a well-conceived disease control program should be established, based on adequate knowledge of the pathogen, the host, and the climatic and cultural conditions under which trees are grown or stored. Effective control of most diseases requires one or more chemical, cultural, genetic, biological, and legal control methods. This paper will focus on some of the more important disease prevention, detection, and control procedures that can be used to help produce and protect healthy nursery tree stock. It will also present some general guidelines for preventing or reducing nursery pests.

Chemical Control

Chemical control is one of the most effective ways to combat diseases (fig.1). It involves preventing inoculum (any part of a pathogen, such as a spore, which is able to infect a host) from entering the host and infecting it. To accomplish this, fungicides have been used to prevent growth or sporulation of pathogens, or to kill or inactivate the inoculum at its source, in transit, or at the site of infection.

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Cultural Control

Cultural control measures are directed at avoiding a disease or suppressing the causal agent, and they can often be worked into normal cultural practices. Most cultural practices involve altering the environment, the condition of the host, or the behavior of the disease by reducing the amount of the inoculum or by avoiding the disease by choice of location, time of planting, plant spacing, nutrition, etc.

Genetic Control

Genetic controls involve the use of immune, tolerant, or resistant species or varieties to prevent or reduce disease impact. This method utilizes techniques that contribute to altering the physiological processes, structural nature, or habits of individual plants or plant populations in order to make them tolerate or resist infection.

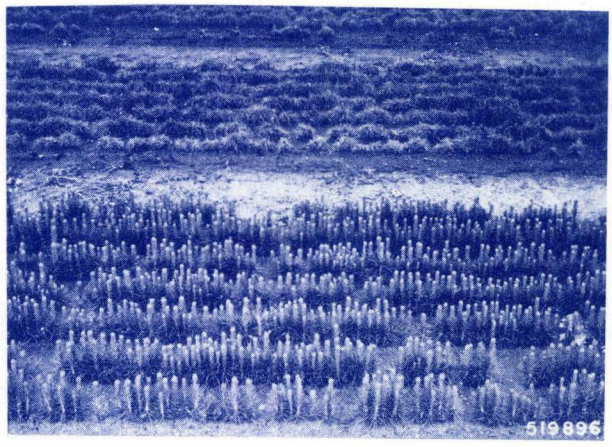

Figure 1.—*Applying fungicides is one of the most effective ways to combat fungus diseases. Unprotected red pine trees in the background were infected with a fungus disease called* Lophodermium seditiosum*; young trees in the foreground were protected from this disease by maneb.*

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Biological Control

Biological control is the deliberate use of a pathogen's natural enemies, such as predators, parasites, and other diseases, to regulate pest populations. Once natural enemies become permanent residents, pests are less likely to increase to damaging proportions. The lasting nature of biological control makes it relatively inexpensive as well as environmentally safe.

Legal Control

Legal controls, such as quarantines, are designed to prevent the introduction of inoculum and the establishment of a pathogen within an uninvaded area. Once nursery disease pests enter new, uninfected areas, they commonly swell to epidemic levels and are more difficult to control.

Pest Guidelines

Here are some general guidelines that can help prevent or reduce nursery pest problems.

1. Before seeding or planting an area, check to see what diseases or insects are present that may harm the trees, and then develop an action plan to deal quickly with those pests.
2. Train workers to be alert for and to recognize pests.
3. Monitor nurseries and storage facilities often, for early detection and control can prevent serious losses. Regularly observe and record the condition of your plants, the abundance of both pests and plant damage, and your management activities and their effects.
4. Seek professional help if you are unsure of what pest you are dealing with or what to do about it. With this help, determine and use available controls for problems serious enough to cause economic losses.
5. Identify the pest so that you can choose the most effective controls.
6. Apply controls at proper times and only when necessary. This saves money and labor, and it prevents the needless introduction of chemicals into the environment.
7. Maintain, store, transport, and plant trees under proper conditions. Improper handling of trees can predispose trees to pests causing serious losses.
8. Use non-host windbreaks. Windbreaks of susceptible species that are grown near nursery beds sometimes serve as reservoirs for pests, which can then infect nursery seedlings.
9. Nursery pest inspectors should visit nurseries when symptoms or signs are most apparent. Sometimes nurseries are certified pest-free because they were examined at the wrong time.
10. Do not ship infected nursery stock.
11. Do not plant diseased trees or trees that are suspected to be diseased. If diseased trees are planted, they can infect other trees in the planting and epidemics may result.
12. Do not exchange stock between nurseries. Several pests have been introduced from one nursery to another when infected stock has been exchanged.
13. Do not exchange nursery equipment unless it is properly cleaned and sterilized.
14. Use only registered pesticides and follow label directions.
15. Maintain a well-balanced diversity of species. This will temper pest outbreaks.
16. Look at the economic advantages of available alternative controls. Some controls may be more effective and less costly than others.
17. Keep accurate records of control successes and failures. This will help you not make the same mistake twice!

Summary

An integrated control approach using the information presented in this paper can help prevent or reduce the impact of major pests in tree nurseries (fig. 2). Its ultimate success depends on adequate dollars, teamwork, early detection, positive pest identification, and proper timing, selection, and application of available controls.

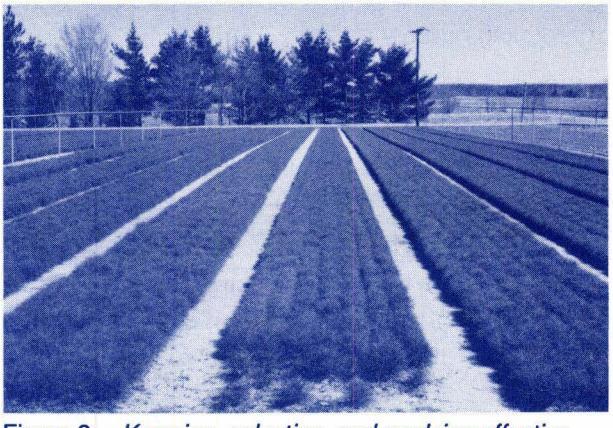

Figure 2.—*Knowing, selecting, and applying effective pest controls at the proper time will help produce and protect healthy trees.*

Motto: Discovering and disseminating knowledge about natural resources.